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## THE RELATIONS OF MIND AND MATTER.

BY CHARLES MORRIS.

*(Continued from p. 1076, November number.)*

## VII. THE PHYSICAL BASIS OF MIND.

THAT the mind has a substantial basis does not need an attempt at argument before a scientific audience. The necessity of this is already fully admitted. For those who are not scientists the arguments we have already given must suffice. The claim that the brain is the organ of mind is based almost solely on this necessity. No other substance is perceptible at the apparent seat of thought, and the cerebrum is claimed as this seat in spite of the insuperable difficulties in the way of such a theory.

Yet there is much substance and much in substance which we cannot hope to ever perceive. Our senses are very imperfect instruments, and make us aware of but a minor portion of what exists. Our most important sense, that of sight, is blind to the great realm of gaseous matter. The microscope reveals to us worlds of existence which the unassisted senses could never have discovered. By the aid of delicate tests and instruments many of the less gross and active conditions of matter have been made apparent. In this way the range of our sensibility has been very greatly increased. And yet we are but on the threshold of the universe. Important conditions exist to which the senses of man have never responded. Important conditions exist to which our physical senses can never respond. We have the strongest reason to believe in the existence of substance all around us of which we can never become sensible.

Some review of the conditions under which substance appears to exist becomes here requisite. In the science of a century past matter was but one of several distinct forms of substance. It was accompanied by a number of *ethers*, or imponderable essences, one each for heat, electricity, magnetism, &c. Indeed, the facility with which a new ether could be constructed to meet every new phenomenon of energy threatened in time to produce a condition as cumbrous as the old epicycle theory of astronomy. That was set aside by the discovery that the earth was a moving instead of a resting body, and the ethers similarly vanished when it was discovered that motion was the distinguishing feature in them all. From this readiness to manufacture ethers the pendu-

lum of belief swung to its opposite side, and a general incredulity on the whole subject of ethers succeeded. In more recent times this incredulity is giving way, and our most skillful physicists are fully persuaded of the existence of one ether, the medium of light radiations. To those scientists the universe contains two distinct substances, matter and ether, which differ radically in their conditions of existence.

Students of the phenomena of light declare that there is no possible escape from this conclusion. Interstellar space is probably occupied by ordinary matter in a state of extreme diffusion, and it might be conjectured that the rays of light could make their way through this substance from star to star. Science declares that this is impossible. Matter, under such circumstances, must be a very rare gas, and no gas can transmit transverse vibrations like those of light. Its degree of diffusion also would be far too great and too irregular. To transmit the rays of light some substance is needed that is very elastic; that, while exceedingly rare, is far more dense than diffused matter would be in interstellar space; and that is in the condition of a rigid solid instead of a free gas. Yet it must be a solid so readily permeable as to present no resistance whatever to the movement of the spheres. As a ball will sink with little resistance through a thin jelly, without leaving a mark of its passage, so must a globe be able to plunge unopposed through the almost infinitely thin jelly of the ether.

Ether has never been seen, felt, weighed or measured. It is absolutely invisible and intangible. No vessel has pores so minute as to confine it. It has properties seemingly contradictory; it must be excessively rare yet perfectly elastic; its physical state must resemble that of the solid while its density is immensely less. We have no proof of its existence resembling our proofs of the existence of matter, yet we are forced to believe in it because physical science cannot possibly do without it. There are hundreds of phenomena which cannot be explained without it, but can readily be explained with it.

Sir William Thomson, in his lecture before the Franklin Institute during the 1884 meeting of the American Association for the Advancement of Science, said of this intangible necessity: "You may regard the existence of a luminiferous ether as a reality of science." "One thing we are sure of, and that is the

reality and substantiality of the luminiferous ether." And he proceeds to say that it is the only thing we are confident of in dynamics. This ether he describes as an elastic solid, its rigidity enormous in proportion to its density. As to whether it possesses weight or not he declares that there is no evidence for or against.

J. Clerk Maxwell speaks as strongly on the subject, and finds a new use for the ether, as the medium of electric and magnetic energy. He advances a theory, which has met with much favor, that "light is an electro-magnetic phenomenon." In other words, both these modes of traveling energy employ the same medium and are carried by it with a rapidity extraordinarily greater than any known movements of vibrations in matter, such as the waves of sound. Ether, therefore, is supposed to permeate all substances, however dense. It conveys electricity through the densest solids, and light through the densest transparents. We can reduce air, by the air pump, to one hundred thousandth of its volume, and yet it is firmly held in a glass vessel. But light passes through the vessel, and through its partial vacuum, without a check. The substance which carries it moves as freely as if no other substance was present.

There is, however, a seeming relation between matter and ether, if we accept the latest atomic theory, that of vortex motion, propounded by Sir William Thomson. It is not necessary here to explain this theory; it will suffice to say that it holds that fragments of the ether possess a vortical motion by which they become separate and indestructible integers. Each such vortex atom must have always existed and must always exist. They are indestructible and unchangeable. No new ones can arise, and no old ones can vanish. They must be coeternal with ether. Their substance is the same as the ether itself. They are simply portions of ether affected with a certain mode of motion. But as thus constituted they are essentially distinct from ether, and the two constitute two unlike conditions of substance. This conclusion is probably true whatever the character of atoms, and whether the vortex atom theory be correct or not.

Professor Oliver Lodge gives the following particulars concerning this substance.<sup>1</sup> The density of ether, though small, is

<sup>1</sup> The Ether and its Functions, *Nature*, Jan. 25, 1883.

enormously greater than that of the earth's atmosphere can be if the atmosphere extends indefinitely into space, as is highly probable. The rigidity of ether is insignificant as compared with ordinary solids, yet its transmitting power is enormously greater than that of steel or glass, on account of its very slight density. The ether within glass transmits vibrations 40,000 times as rapidly as the particles of glass itself could do. But the atmospheric ether carries these vibrations at a speed one-half greater. The speed, therefore, is checked within glass to two-thirds its normal amount. Why is this? Is ether affected by gross matter, and concentrated by attraction so as to increase its density? Fresnel's hypothesis is, that the ether is really denser inside gross matter. He thinks that an attraction exists between ether and the molecules of matter which results in an agglomeration or binding of some ether round each atom, and that this bound ether belongs to the matter and travels with it. The free ether may flow without check through the pores of matter, and even through those of the earth as it dashes onward through space. Refraction of light from such a cause is attributed to bound ether, which seems to act differently on the different colors.

Certain experiments have been tried to prove whether any of the ether can be bound. If ether is carried along with a moving stream, as of water, it should hasten the speed of light passing through that stream. If not carried by the stream there could be no effect on the speed of light. The results of these experiments have been favorable to the hypothesis. Yet the variation in the speed of light from such a cause is so slight that it is difficult to reach any very positive conclusions on this subject.

That ether possesses energy is unquestionable. It moves with such extreme readiness that it cannot fail to possess a large sum of normal motions. Its physical condition also is indicative of conditions of energy. Elasticity, rigidity, solidity are due in matter to the interactions of attraction and motion, and we have no warrant to ascribe them to any other cause in ether. But the motions normal to ether are certainly very different from those normal to matter, since ether refuses to accept the motions communicated to it by matter. This is what we must understand from radiant light and heat. Matter forces its motions upon ether, but the latter substance refuses to absorb them, and merely transfers them, with the utmost rapidity, to some distant mass of

matter. We know that the sun exists because its energy is transmitted to the earth by the ether, and acts upon the matter of the earth. Were not the ether a perfect transparent to this material energy we could never become aware of the existence of sun and stars, since their light and heat-rays would be swallowed up long before they could reach us.

Ether is, in fact, the most homogeneous body in the universe. It is in a state of motor equilibrium, its motions probably being exceedingly more rapid than those of ordinary matter. It has no direct motor relations with matter, but transmits to distant matter all motion forced upon it, by aid of the vibrations of its particles or separate portions, which are localized in position, like those of the solid. J. Clerk Maxwell speaks of it as follows: "Whether this vast homogeneous mass of isotropic matter is fitted not only to be a medium of physical interaction between distant bodies, and to fulfill other physical functions of which, perhaps, we have as yet no conception, but also, as the authors of the *Unseen Universe* seem to suggest, to constitute the material organism of beings exercising functions of life and mind as high as or higher than ours at present, is a question far transcending the limits of physical speculation."<sup>1</sup>

Not having read the *Unseen Universe*, I am unaware of the precise character of its speculations, yet I cannot imagine the luminiferous ether as possessed of such powers. For life and mind organization seems necessary, and organized ether is distinct from free ether, and must be some condition analogous to matter, which is probably one form of organized ether. Bound ether, or atom atmosphere, may represent such a second state of organized ether. For all we know to the contrary a second series of atoms may be formed by this condensing action of matter on ether, atoms intimately connected with matter and assimilated with it in motion, yet differing in density of substance and motor rapidity. It may be possible that several series of such atoms exist between matter and ether, each capable of forming a basis of life and mind. Whether originating independently, or each rarer series formed by the condensing action of a denser series, the energies emitted by the atoms of one series could not act on those of another series. Free ether would serve as a medium for the vibrations of them all, but the vibrations yielded by each would pass unresisted through the substance of every other series,

<sup>1</sup> Article "Ether," *Encyclopædia Britannica*.

and only be absorbed by substance of the same series. The range of material vibrations seems to be from about a hundred million million, or perhaps lower, to sixteen hundred million million pulsations per second. The slowest vibration emitted by an atom of rarer constitution might lie above this speed, and range upward from this point of rapidity.<sup>1</sup>

It is with the bound ether that we are here concerned, that which, in the opinion of many able scientists, surrounds material atoms and molecules like an atmosphere. The existence of such an ethereal atmosphere carries with it the implication of some conformity in motion between the atom and its atmosphere on the same general principle that operates in the case of the earth's atmosphere. And the condensing relation between the atom and its atmosphere can hardly be any other than that of attraction. Yet it does not necessarily follow that the motions of the bound ether must be in every respect identical with those of the atom it surrounds. A motor leverage doubtless exists between them, but leverage of a different character may act on this bound ether from without. It may possess special motor conditions of its own, as the terrestrial atmosphere while possessing the general motions of the earth has special motions which are not shared by the solid matter of the earth's mass.

These conclusions seem almost necessary deductions from the widely accepted view, above given, of the relations of matter and ether. There is another conclusion, at which we have already hinted, not a necessary yet a conceivable consequence. This is, that bound ether may, under certain favoring conditions, attain an organized state not dependent upon that of matter, and be capable of permanently retaining this condition. If, as is probable, molecules composed of many atoms possess an ethereal atmosphere, then the disruption of the molecule need not necessarily disrupt its associated ether. Though ether is organizable under the influence of matter, yet the forces which disrupt gross matter might, in certain cases, become powerless upon ether. If so, a mass of ether which had been organized by the influence of a mass of matter might retain that organization unimpaired after

<sup>1</sup> For an able and elaborate treatment of this subject see Professor A. S. Herschel's letters in *Nature*, Vol. 27, pp. 458, 504, and Vol. 28, p. 294. These were written in answers to articles by the writer on "The Matter of Space," and constitute an important treatise on the constitution of the ether, its relations to matter, and its possible atomic variations.

the material mass had become disintegrated, and might continue to exist as a molecule or mass of a constitution much more rare than that of matter.

Possibly this power of becoming independent does not exist in the case of atomic or molecular atmospheres of bound ether. But it may do so in the case of the bound ether of more developed compounds. We may look upon the crystal, the plant, the animal, even on the body of man as possessing, in addition to the free ether that readily permeates them, a mass of condensed or bound ether which reproduces every detail of their organization and every specialty of their motion, from that of each atom to that of the organism as a whole. In such a case the cerebrum might possess such an ethereal atmosphere, not only reproducing it in organization, but affected in its motor relations by every impulse received from without which is not consumed as muscular motion. There are certain good reasons for believing that such a psychic substance exists, intermediate in condition between matter and ether, and sending out vibratory energy like that of matter. This psychic substance yields no energies which can affect matter at a distance, and it is not affected by the emitted energies of distant matter. It can affect matter and be affected by it only while an intimate connection exists, like that between the cerebrum and its psychic atmosphere, and only through the agency of this connection. In this relation the psychic substance assumes the general motor conditions of the cerebrum, with which it is so intimately associated, and is also sensitive to special motor conditions coming from distant matter. It is, therefore, organized by the conditions of energy in the material universe. It, in addition, gains special motions through its own interactions, and impresses these upon the universe. As compared with matter its substance is excessively rare and its motions excessively rapid. Its mobility is therefore extreme, and its susceptibility to new influences far beyond anything existing in matter. Finally it may be capable of retaining its organization separate from matter, its constitution being such that the disrupting energies which destroy the organization of matter are powerless to affect the psychic organism, they being repelled from its surface, or passing through it as innocuous vibrations. Under some such conditions, and such only, can we comprehend the existence of a physical basis of mind. And thus only can we conceive the



possibility of the existence of the mind after the disruption of the body, in substance absolutely imperceptible to our senses, yet forming organisms which may be as evident and substantial to each other as are our material bodies to each other.

So far all this is pure hypothesis. We have only offered as evidence for the existence of a psychic substance the seeming incapability of the brain to serve as a mental basis. Yet other evidence exists of considerable force and value. We know that a psychic substance must exist for the same reasons that we know an ether exists. We cannot see, touch or weigh either, but there are phenomena in nature which we cannot possibly comprehend without them. We believe in the ether because there are things done in the universe which matter could not possibly do. We may find ourselves forced to believe in a psychic substance for reasons of the same kind.

If masses of matter send out radiations of light and heat which affect distant masses of matter, then psychic masses, when actively excited, should send out parallel radiations which will affect other psychic masses, but fail to act upon matter. Evidence of the existence of such a condition is by no means rare. Every mind seems to send out psychic radiations which flow like light rays through ether in every direction, weakening with distance. At least by such a hypothesis we can understand some very remarkable mental phenomena which now stand as incomprehensible mysteries. These we can but briefly glance at. One very common instance of this, which has occurred to most people, is the tendency to think and speak of a person immediately before he appears. Some indication of his coming seems to be in the air, but as an influence that acts not on the senses but directly on the mind. In certain instances persons declare that they can see a mental image of every approaching friend. If our hypothesis be true, it must be that every mind sends out radiations peculiar to itself, as every physical object does, that this peculiarity is recognized by the receptive mind, and consciousness directed thereby to the mental image of the person to whom the emissive mind belongs, precisely as it would if we saw some physical object belonging to that person.

When the emissive mind is actively exercised and is strongly thinking of the receptive person, this influence may be carried to much greater distances, and may rouse the consciousness of the

person thought of at thousands of miles away. We shall give, further on, an instance of this kind. The psychic rays may be viewed as preserving the record of their source at any distance, as in the star beams we can read the story of the physical constitution of the star, however enormously distant.

Another less common phase of this action is the tendency for two persons to speak simultaneously of the same thing. This is of various strength in various cases. One lady tells me that she formerly had a girl for companion in whose presence she did not dare to think of anything she wished kept secret, for the girl was exceedingly apt to speak of anything the instant she had thought of it. The power to make a person turn by fixing a steady gaze upon him is of this same general character. Numerous instances of these more ordinary phases of psychic intercommunication might be adduced, but we shall here mention them only in this brief manner.

One thing is evident, even in these phases of the subject, that there are great differences between the emissive and receptive power of different persons. This becomes much more marked in special cases of psychic influence. It may be to some extent, a question of transparency and opacity. We know what very great differences exist in the conductive powers of different substances for electricity. Psychic radiations may find like variations in the physical conditions of different individuals. From one mind they may flow out as through a transparent. In others they may be more or less resisted by the matter of the body. In some cases the resistance may be complete. Reception may present the same variations, a sensitive or medium being one who is unusually receptive of these vibrations. Such an idea would explain the vigorous mesmeric controlling power of some minds and the ready yielding to mesmeric control of others. And on the principle that nerve currents flow most easily along a familiar channel, we may understand the special rapport between certain operators and sensitives. In this case the body substance of the sensitive has grown specially transparent to the psychic emanations of the operator, while it may be more or less opaque to the emanations of other minds.

As to the evidence of a more decided character than that above given of psychic intercommunication, a vast volume of incidents might be offered. But the great sum of these lack the

essential element of scientific precision of investigation. It will be best, therefore, to confine ourselves to the results attained by the London Society of Psychic Research, since the experiments of this society have been conducted under strict test conditions, and the reputation of its members as working scientists gives a weight of credibility to their testimony. After the elimination of every imaginable source of error, results were attained which seem to prove incontestibly the direct intercommunication of mind with mind. These results are given in full detail in the published Proceedings of the society, but can be only briefly glanced at here. They consist of what is called thought transfer, mesmeric experiments, phenomena of apparitions and other strange conditions of mental manifestation.

In the thought transfer experiments we have striking evidence of the action of mind on mind without the aid of the senses. In these experiments objects, numbers, &c., were named, and drawings reproduced with no other guide than the mental concentration of the persons who alone knew the character of the object or drawing. The successful results formed so large a percentage of the whole as to leave chance quite out of the category. There seemed no room for doubt that the thought in the mind of the impressing persons had directly acted on the mind of the sensitive, without possible sensory connection. In explanation of these and other phenomena, Messrs. Gurney and Meyers offer a theory of telepathy, or direct communication of mind with mind without sensory aid. But their theory is imperfect in that it lacks the conception of any physical medium of intercommunication as here advocated.

*(To be continued.)*

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## FLOODS, THEIR HISTORY AND RELATIONS.

BY WILLIAM HOSEA BALLOU.

**F**LLOODS vary in their intensity and duration according to their geographical range. There are two great flood ranges in the United States lying nearly at right angles, one of duration and the other of intensity. The first is the Mississippi river and its confluent, and the second the Ohio and tributaries.

The Mississippi and Missouri rivers lie in a north and south line, and their floods are continuous from early spring until the middle of July, on account of the slow advance of the sun's heat